Verifying Ontology Requirements with SWIP

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Abstract. Verifying whether an ontology meets the set of established requirements is a crucial activity in ontology engineering. In this sense, methods and tools are needed (a) to transform (semi-)automatically functional ontology requirements into SPARQL queries, which can serve as unit tests to verify the ontology, and (b) to check whether the ontology fulfils the requirements. Thus, our purpose in this poster paper is to propose a query pattern-based approach to transform ontology requirements into SPARQL queries to facilitate the activity of verifying whether an ontology satisfies the set of established requirements.

Keywords: Ontologies, requirements, SPARQL, natural language queries

1 Ontology Requirements

One of the key activities when developing ontologies is to identify the functional and non-functional requirements the ontology should fulfil. Guidelines for eliciting and specifying ontology requirements have been proposed in the context of the NeOn Methodology [1]. These guidelines suggest specifying functional ontology requirements using the competency questions technique. Competency questions (CQs) were proposed in [2] and defined as questions that the ontology to be built should be able to answer. The idea behind these questions is to ensure that the ontology being developed is competent enough to respond to queries that may be posed to a system that uses the ontology. Thus, CQs also act as a unit test suite for the ontology.

The activity of checking whether the developed ontology is in compliance with a set of ontology requirements is called ontology verification [1]. One approach for performing this activity is (a) to transform (semi-)automatically functional requirements (as CQs) in SPARQL queries and (b) to check how many SPARQL queries obtain a response from the ontology.

2 Applying SWIP to verify Ontology Requirements

The goal of SWIP, standing for Semantic Web Interface Using Patterns, [3] is to provide end users a means to query knowledge bases using natural language queries and thus hide the complexity of formulating a query expressed in a graph query language such as SPARQL. The main postulate leading this work states that, in real applications, the submitted queries are variations of a few typical query families. Our approach differs from existing ones in the way that we propose to enhance the effectiveness and the efficiency of the query building step by using predefined query patterns which represent these query families. The use of patterns avoids exploring the ontology to link the semantic entities identified from the user query since potential relations are already expressed in the patterns. The process thus benefits from the pre-established families of frequently expressed queries for which we know that real information needs exist.

SWIP has been adapted in order to translate CQs into SPARQL queries. First, SWIP generates query patterns automatically by analyzing the set of CQs and the ontology being built. Then, the patterns are used to generate a SPARQL interpretation for each CQ. For each of the CQs, SWIP presents to the ontology development team the answers retrieved in the ontology. These answers should be checked by the team: in the case they are not compliant with the concerned CQ, the team should update the ontology consequently. This approach is shown in Figure 1.

Even if the checking process keeps hand driven by the ontology developer, the activity is now considerably lightened by the CQs automatic translation using the SWIP approach. A promising evaluation is being carried out with a set of CQs and an ontology about football developed in the context of the Buscamedia project[1].

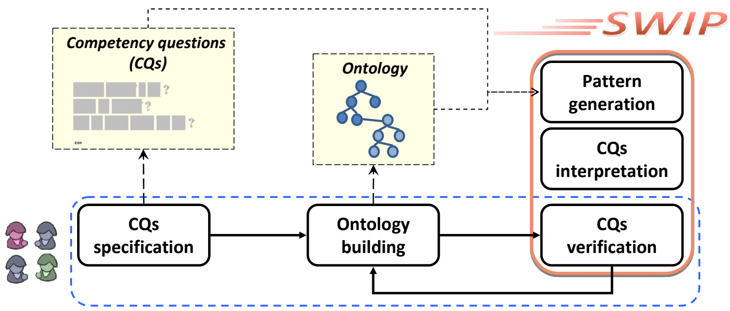

Fig. 1. General approach

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